A Comparison Of Ram Semen Collected By Artificial Vagina and Electro-Ejaculation

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Abstract
This aim of this study was to compare the quality of ram semen samples collected by means of artificial vagina and by electro-ejaculation. Semen samples were collected from 18 young post pubertal Dorper rams by both methods and analysed for quality by standard laboratory procedures. Results showed that both methods are suitable for semen collection in rams, but the artificial vagina collection method produces better semen samples with higher concentration and percentage of live sperm than electro-ejaculation. No differences in sperm morphology were found between the two semen collection methods.

Keywords: Rams, semen collection, artificial-vagina, electro-ejaculation
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Introduction

Ram semen is collected mainly for two reasons, firstly for breeding soundness evaluation (fertility) and secondly to be of use for artificial insemination (A.I.), either as fresh semen or as frozen-thawed semen. For both purposes, it is important to obtain a good semen sample, because the better the semen sample collected, the higher the conception rate obtained after A.I. from this semen. It is also important to evaluate a ram for breeding soundness, using a semen sample that truly reflects its potential fertility. Very few reports in the literature available compare these two semen collection methods in livestock species in general and ramsin particular. The latest report available is over 40 years old (Matter & Voglamyr, 1962). In a trail on red deer Fennessy *et al*. (1990), found that electro-ejaculation was very variable and that the semen was often contaminated with urine, and thus had poor motility. Elmore (1985) found that semen containing high numbers of abnormally shaped sperm is generally associated with low conception rates after A.I. The aim of this study was to compare the quality of ram semen samples collected by means of an artificial vagina and by electro-ejaculation.

Materials and Methods

This trial was conducted at the University of the Free State in Bloemfontein. Eighteen young post pubertal Dorper rams aged between 14 and 15 months were previously trained for semen collection by means of an artificial vagina. At day one of the trail, semen was collected from all rams by means of an artificial vagina and discarded. Three days later (day 4) semen was again collected (early in the morning) from all rams by the same method. The temperature of the water used in the artificial vagina was 54°C. After a resting period of 3 days, (on day 7) semen was again collect (early in the morning) by means of electro-ejaculation from all rams. Immediately after semen collection, the colour of the semen sample was noted and the volume of the ejaculate was measured using a graduated semen collection tube. The fresh semen samples were then kept warm in a water bath at 32°C until analysed for forward progression within 10 minutes of collection. The semen samples were evaluated using standard laboratory procedures (Loskutoff & Crichton, 2001). The semen was mixed with pre-warmed (32 °C) PBS solution (990µl PBS and 10µL semen), to determine forward progression on a scale of 0 to 5 (Loskutoff & Crichton, 2001). A thin semen smear was made on a glass slide and coloured with Eosin/Nigrosin, (60µL Eosin/Nigrosin and 6µL semen). This was then later analysed under a microscope for morphology at 1000x magnification. A total of 100 sperm cells from different areas of the slide were individually evaluated for morphology, sperm abnormalities were classified as head, mid-piece and tail abnormalities. Raw semen was mixed thoroughly, but gently, with water (990µL of water and 10µL of semen) and 10µL was placed on an improved Newbawer haemocytometer grid to determine the sperm cell concentration of the sample. The total number of sperm cells lying inside the five blocks that formed a diagonal line was determined and this count was then multiplied by five to get the concentration of sperm cells in the semen in millions per ml. The results

from the semen samples collected by the two different methods were compared using one-way ANOVA procedures of Excel 2002.

Results and Discussion

Table 1 Characteristics of Ram semen collected by Artificial Vagina and by Electro-Ejaculation

	Semen collection method	
Semen parameter	Artificial vagina Mean ± SD	Electro-ejaculation Mean ± SD
Volume (mL)	1.1 ± 0.4[a]	1.3 ± 0.4[a]
Forward progression (0-5)	2.5 ± 0.4[a]	2.5 ± 0.6[a]
Semen concentration (*10^3/mL)	1671.9 ± 427.3[a]	1115.8 ± 517.2[b]
Live sperm (%)	60.5± 11.0[a]	49.9 ± 14.8[b]
Sperm Morphology		
Normal sperm (%)	94.3 ± 3.4[a]	95.6 ± 2.3[a]
Head abnormalities (%)	0.83 ± 2.3[a]	0.7 ± 1.1[a]
Tail abnormalities (%)	4.9 ± 4.5[a]	3.7± 3.4[a]
Mid-piece abnormalities (%)	0	0

[a, b] Row means with different superscripts, differ significantly ($P < 0.05$)

Semen samples were successfully obtained from all rams by both methods. No significant differences were observed between the two semen collection techniques in terms of semen volume, forward progression and sperm morphology (abnormalities). However, semen collected by means of an artificial vagina showed significantly ($P < 0.05$) better concentration and higher percentage live sperm than that collected by electro-ejaculation. In previous trials a greater volume of semen but a lower concentration of spermatozoa were obtained by electro-ejaculation when compared to semen collected by artificial vagina in rams (Mattner & Voglmayr, 1962; Salamon & Morrant, 1963; Memon & Ott, 1981). Bertschinger (1995) stated that while semen quality can be fairly acceptable when collected by electro-ejaculation means, it seldom compares with the quality of semen collected by means of an artificial vagina. He further stated that the volume may increase and the concentration can decrease with electro-ejaculation. From the results of this trial, it can be said that electro-ejaculation can be used satisfactorily for breeding soundness examination purposes, but not much emphasis should be put on the results obtained for sperm concentration and percentage live sperm cells. To collect semen for A.I., it seems that samples collected by artificial vagina should be preferred as they result in higher concentration (more insemination doses) and higher percentage of live sperm cells (better semen quality). Gordon (1983) is also of the same opinion.

Conclusions

Both semen collection techniques compared were effective for semen collection in rams. Electro-ejaculation is more practical as it does not require previous training of the rams and can be used for breeding soundness examination. Artificial vagina requires previous training of the rams, is more time consuming, but results in the collection of better semen samples with higher concentration and better percentage of live sperm cells.

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